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An Alternative Landfill for Vancouver

B.C.'s Highland Valley Copper landfill project

A few years ago it seemed all but certain that the Greater Vancouver Regional District's (GVRD) next landfill site would be at the Ashcroft Ranch near the existing Cache Creek landfill. When it became apparent that Cache Creek would not be expanded due to First Nations opposition, Wastech, the GVRD's contractor, evaluated 15 sites in the Thompson-Nicola and Squamish-Lillooet Regional Districts, finally selecting the Ashcroft Ranch site for a new facility.

On behalf of the GVRD, Wastech entered into a Purchase Agreement for the ranch in 1999, which was transferred to GVRD in 2000. In May 2003, Teck Cominco (TC), which owned the Highland Valley Copper (HVC) mine near Logan Lake, pitched this site as an innovative alternative to the Ashcroft Ranch. This site had not been considered during the earlier site selection process. Now, with the environmental assessment for the Ashcroft Ranch Project suspended in June 2005, the HVC project is starting to look like a serious contender; it's being touted as the regional landfill that will provide capacity for many communities, and at a competitive cost.

The site

Clicking through the literature, the site's positive attributes become obvious: a virtually limitless supply of construction materials ranging from liner-suitable silty clay, crushed rock, plus the huge equipment needed to move it around, complete with maintenance shops. The 100-hectare brownfield site — already impacted by resource extraction — has a proposed 50 per cent smaller footprint than the greenfield site proposed at Ashcroft. (To put this into context, the 50 million tonne landfill would use only two per cent of the 6,000 hectare mine site. The landfill is easily expandable; the proposed 50 million tonnes was based on offering a project alternative that would be similar in scope to that being proposed for Ashcroft.)

With the availability of construction materials, the smaller footprint, and the large-scale mining equipment, TC believes an estimated \$80 million in savings can be realized in the capital costs of the liner, collection system and closure cap. There are plans to develop a waste-to-energy facility once the quantities of gas produced are known, and the possibility of greenhouse credits sorted out. Estimates show that enough energy could be generated to power at least 7,000 homes.

Community issues

The proposal would act as a buffer against the blow the community of Logan Lake will face in 2013 (when the mine is scheduled to close). A critical part of TC's pitch is their commitment to being good neighbours. David Parker, director of corporate affairs & sustainability for TC, explains: "It's a long-standing policy that when we are looking towards the closure of a mine, we also look at what opportunities

there are to create a sustainable legacy. The council of the host community of Logan Lake has already passed a unanimous resolution supporting consideration of the project, so right now we are very focused on addressing the First Nations interests."

Parker has his work cut out for him as there are about 17 affected First Nations groups. Still, he is optimistic. Of the two bands with a major interest, one is reasonably supportive, while the other band has not said "no," TC is working on a schedule to address the issues of all the First Nations groups. The HVC site has much to offer the community; Parker continues.

"We have massive storage buildings that can be available for recycling depots," he says. "We are even looking at developing a high tech e-waste facility. We have housing, maintenance shops, and later we will have a waste-to-energy plant, and the jobs that go with this infrastructure."



Putting things in perspective: The proposed 100-hectare landfill (outlined area) represents just two per cent of the 6,000-hectare mine site.

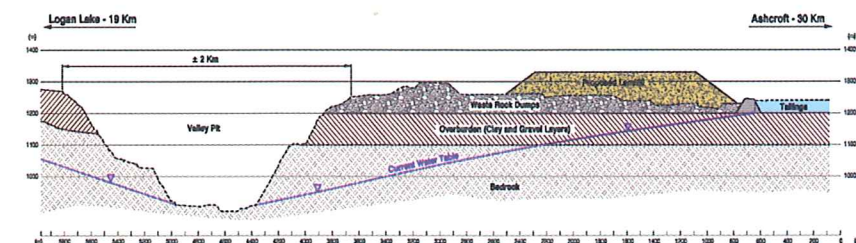
HVC hopes to use operators from the nearby Cache Creek landfill which is slated to close in 2008-09 (the same time the HVC landfill is slated to open). Equipment modification is a non-issue as the maintenance shops can handle anything from a pickup truck to a 250-tonne dump truck. From a transportation perspective, a large trucking company interested in the work prepared a comprehensive analysis on moving garbage north and wood chips south. They determined that neither site under consideration had a marked advantage.

The HVC proposal was kicked off in August 2004, followed by the first open house in September and the application for an environmental assessment in June 2005. HVC is in the pre-application phase; the application will be submitted in June 2006, after which time the assessment office has six months to review and decide on the application.

In preparation for the well-attended open houses in September 2004 and June 2005, TC put together a team made up of TC executives, HVC staff and Sperling Hansen Associates (SHA) to plan, present and design the project. In response to the open houses they have strengthened their EA team by adding expertise in traffic management, groundwater hydrology, First Nations and public relations.

Operations and geotech detail

The biggest challenge from an operational perspective is addressing transportation concerns. Mark Freberg, superintendent of environmental services for HVC, elaborates.



Typical schematic cross-section. (Vertical exaggeration 2x)

"The big issue for Logan Lake is traffic," he says. With about 50 trucks a day going to the landfill we had to create options to mitigate the impact on the community. The two options on the table include building a bypass around the community, or improving existing infrastructure. We think infrastructure upgrades may be the better option as it would also bring benefits to the community in the form of improvements; adding traffic lights, overpasses and underpasses for pedestrians, snowmobiles and ATVs."

From a technical perspective this landfill proposal is interesting; the landfill site is on top of a mine-waste dump pile, not in the pit. Both mining and landfilling operations can operate simultaneously. The proposed triple liner system for the HVC landfill is 750 times more effective than required by provincial regulations. (In fact, it easily exceeds EPA requirements.) A bioreactor system is being proposed to rapidly reduce the contaminating

lifespan and to stabilize the waste pile.

Building a landfill on a waste dump is something new. Dr. Tony Sperling PhD., P. Eng. and President of SHA in North Vancouver BC explains.

"To my knowledge, the idea of operating a landfill on top of a waste rock pile in an operating mine was pioneered by Gibraltar Mines in B.C. [winter 2002/03]," he says. "I believe that HVC would be the second."

The concept for the HVC landfill is based on the success of the 16 hectare, 10,000 tonne/year award winning project at the Gibraltar site.

From a geotechnical and hydrogeological perspective the waste dumpsite is attractive. On an active day about 400 trucks weighing up to 300 tonnes are end-dumped. This kind of repeated loading on angular (predominantly 150mm minus [maximum size of 0.6m]) has resulted in a stable waste pile. Additionally, the water table is 90m below the surface.

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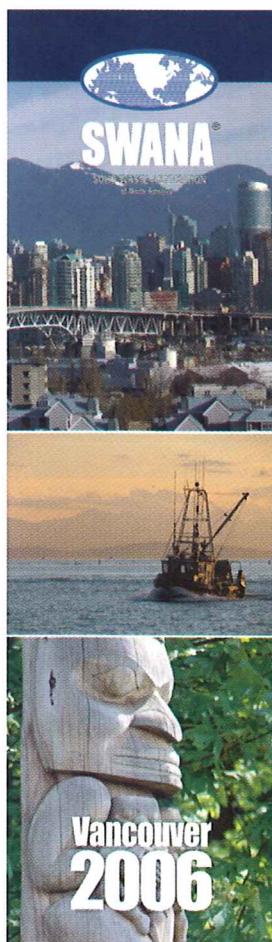
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Site prep for the triple liner involves general shaping of the site to create a smooth surface, and a gently sloping grade at the base for leachate collection. The primary liner will be made of a 60 to 80 mil sheet of HDPE, a proven and long-lasting geomembrane liner material. The secondary liner will be a bentonite layer from either a deposit about 40 kilometres away, or a geosynthetic clay liner (GCL). GCLs (layers of clay sandwiched between thick geofabrics) have been around for about 10 years. What makes them attractive is that they can handle differential settlement; performance is not impacted by freeze thaw cycles, installations are less sensitive to inclement weather, quality assurance time on site is reduced, and the manufacturers claim that one truckload of the GCL is equivalent to



The landfill will be run as a bioreactor.



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"The 100-hectare brownfield site — already impacted by resource extraction — has a proposed 50 per cent smaller footprint than the greenfield site proposed at Ashcroft."

150 truckloads of clay. The tertiary liner deployed on top of the existing waste rock pile will be comprised of a metre-thick layer of a low permeability (hydraulic conductivity 5×10^{-7} cm/s) material from the mine. A final cushion of heavy geotextile fabric will protect the primary liner.

The drainage and collection system will be a 150mm layer of sand cushion overlain by crushed rock. This sets the stage for a bioreactor approach to waste decomposition. Sperling explains: "To encourage the growth of Methanogenic Bacteria — bacteria that allows for anaerobic decomposition of organics and methane production — we need an optimum moisture content, typically about 60 per cent.


"The leachate will be collected and treated through aeration to remove the metals. Because the precipitation in the area is less than the optimum needed to encourage the methanogenic bacteria growth (about 400 mm/year, some half of that in snow) we plan to recirculate the treated leachate back into the dump. As the project develops we may add water to optimize conditions. Of course we won't know how much

water will be needed until we gain site specific experience."

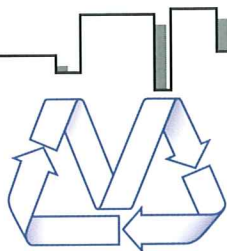
This system wouldn't work well in a coastal environment, since coastal landfills act like bioreactors due to high moisture.

"The biggest challenge from a technical perspective will be to get the bioreactor running smoothly," Sperling says. "This is really leading edge technology in North America; people have only been experimenting with it in the last 5 years."

What's in it for HVC?

"There will be costs associated with the mine for many years after closure. Water management and site monitoring are two big ones," Freberg explains. "So of course we look for ways to generate revenue to offset these costs, but our primary focus is to generate long lasting economic benefits for the communities we know will be affected by the mine closure." 

Tonia Jurbin, P. Eng., is a Burnaby-based freelance writer and geotechnical engineer. Contact Tonia by visiting www.toniajurbin.com



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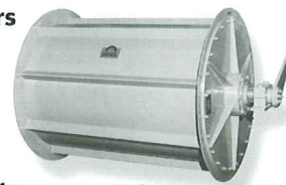


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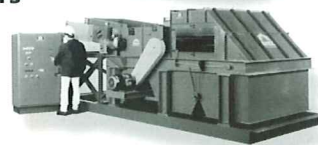
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